# Performance Requirement: Worker Health and Safety:

**Biological Safety; Chemical and Hazardous Materials Handling; Confined Spaces Safety; Construction Safety; Electrical Safety; Environmental Restoration and Decontamination and Decommissioning (D&D) Safety; Ergonomics; Explosives Safety; Fire Protection; Firearms Safety; Food Sanitation; General Occupational Safety; Ionizing Radiation Safety; Materials Handling Safety; Nonionizing Electromagnetic Radiation and Field Safety; Nuclear Criticality Safety; Occupational Medicine; Pressurized Systems and Cryogens; and Traffic Safety**

**Standard Statement:**

The Laboratory's goal is to accomplish its mission cost-effectively while striving for an injury-free workplace, minimizing waste streams, and avoiding adverse impacts to the environment from its operations.

Worker health and safety is an integral part of doing any work at the Los Alamos National Laboratory and, accordingly, effective worker protection will be provided for by a balanced allocation of resources. Specific safety areas are: biological safety; chemical and hazardous materials handling; confined spaces safety; construction safety; electrical safety; environmental restoration and decontamination and decommissioning (D&D) safety; ergonomics; explosives safety; fire protection; firearms safety; food sanitation; general occupational safety; ionizing radiation safety; materials handling safety; nonionizing electromagnetic radiation and field safety; nuclear criticality safety; occupational medicine; pressurized systems and cryogens; and traffic safety.

## General

**Performance Criteria:**

1. Institutional worker health and safety requirements/guidance that address the worker health and safety Work Smart Standards, (i.e., Laboratory Implementation Requirements (LIRs), and Operational Support Tools (OSTs) including the Laboratory Industrial Hygiene and Safety Manual (LIHSM)) must be made available to all Laboratory organizations, including subcontractors.
2. Line management shall be responsible for the protection of workers, the public, the environment, and property. Every member of the workforce shares this responsibility, which extends in an unbroken chain from external sponsors through the Director and to workers performing the work. Employees must be involved in the structure and operation of the safety and health program, and in decisions that affect health and safety. Employees will notify appropriate managers of hazardous conditions and practices, and will shut down operations that constitute an imminent danger. Employees shall be knowledgeable about and adhere to applicable safety policies, standards, and procedures. Employees shall not be discriminated against for raising these concerns.
3. Clear and unambiguous lines of authority, responsibility, and accountability shall be established and maintained so that everyone understands their individual and

organizational safety roles. All levels of management and employees are accountable for ESH.

A discipline program reinforces accountability and incentive programs reinforce positive ESH performance. The programs are documented, communicated, and effectively utilized.

4. Every member of the workforce shall have the experience, knowledge, skills, and abilities necessary to discharge their responsibilities. Supervisors must ensure that their workers are competent to safely accomplish the work.
5. Management effectively prioritizes and allocates resources to address safety, programmatic, and operational considerations. Safety and health have priority at least equal to other organizational values such as production and quality. No work will be performed unless it can be performed safely. Whenever activities are planned and performed, adequate protection of the workers, the public, the environment, and property are paramount.
6. Before work is performed, the associated hazards shall be evaluated, mitigated, and controlled based on LANL's safety standards and requirements. The hazard controls will be identified and implemented using the hierarchy of controls (i.e. substitution, engineering, administrative, and personal protective equipment). The controls shall be established, which when properly implemented, ensure that the workers, the public, the environment, and property are protected from adverse consequences.
7. Administrative and engineered controls and other expectations to prevent and mitigate hazards are tailored to the work and associated hazards.
8. The conditions and agreements to be satisfied for operations to be initiated and conducted are clearly established and agreed upon by those involved.
9. Line management observes the activities of their workforce to ensure they meet activity, facility, and institutional expectations. This includes assessing results, identifying process improvements, taking effective corrective actions, and sharing lessons learned. Owning facility directors ensure that work within their facility meets facility and institutional expectations.
10. Records associated with health and safety activities are appropriately maintained.
11. Assessments shall be conducted to determine program effectiveness to assure continuous improvement, and to identify patterns which may lead to the identification of systematic problems not perceived when looking at isolated incidents.
12. Subcontractors are contractually held to applicable LANL health and safety requirements.

### Appendix 1

### Biological Safety

**Performance Criteria:**

1.1. Worker health and safety at the Laboratory is assured for biological work by addressing aspects of biosafety including infectious agents, animal research, bloodborne pathogens, immunization, foreign travel, tissue and cell culture, recombinant DNA, biosafety practices, related equipment and appropriate personal protective equipment, disinfection and sterilization, and field work (e.g., animal trapping). Biological waste, transportation, and toxins are outside of this scope.

**Contractual Work Smart Standards:**

29 CFR 1910.1030, Blood-Borne Pathogens

Occupational Safety and Health Act of 1970 (OSHA), General Duty Clause, Public Law 91-596, Section 5(a)(1)

"Biosafety in Microbiological and Biomedical Laboratories," U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention and National Institutes of Health, 3rd Edition, May 1993.

42 CFR 72, Interstate Shipment of Etiologic Agents

9 CFR Chapter 1, Section 2.31, Institutional Animal Care and Use Committee

Policy on Humane Care and use of Laboratory Animals, National Institutes of Health, Revised September 1986, Reprinted March 1996

Guide for the Care and Use of Laboratory Animals, National Research Council, International Standards Book Number 0-309-05377-3

## Appendix 2

## Chemical and Hazardous Materials Handling

**Performance Criteria:**

2.1. Worker health and safety at the Laboratory is assured for chemical and hazardous materials handling by addressing the generic health and safety considerations for handling hazardous chemicals in laboratories, facilities operations, and construction activities. It includes corrosives, carcinogens, combustibles, flammables, oxidizers, heavy metals, reactive and explosive chemicals, pesticide and herbicide application and use, toxins/proteins/enzymes, toxic substances, chemical exposures, controlled substances, chemical inventory, chemical storage, asbestos (worker and environmental protection), lead exposure, ventilation, and appropriate personal protective equipment. Recombinant DNA, chemical and mixed wastes, and ventilation beyond the fume hood are outside of this scope.

2.2. OSHA requirements shall be achieved by a reasonable combination of engineering controls, work practices, and personal protective equipment. Where ACGIH Threshold Limit Values are more stringent, they shall apply.

**Contractual Work Smart Standards:**

21 CFR 1301, Controlled Substances

40 CFR 68, EPA Risk Management Rule, as applicable

40 CFR 150-189, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (FEPCA) certified pesticide applicators

40 CFR 170, 171, Subchapter E, Pesticide Programs

40 CFR 261-265, HAZMAT Disposal

40 CFR 720, Toxic Substance Control Act

29 CFR 1904.1-13, Recording Occupational Injuries

29 CFR 1910.94, Ventilation

29 CFR 1910.106, 144, 108, 114, 1200 115, 178, Flammable and Combustible Liquids

29 CFR 1910.110, 103, 252, 253, Flammable Gases

29 CFR 1910.119, Process Safety Management

29 CFR 1910.120, Hazardous Waste Operations and Emergency Response

29 CFR 1910.132-138, Personal Protective Equipment

29 CFR 1910.147, Lockout/Tagout

29 CFR 1910.151, Medical Services and First Aid

29 CFR 1910.1000, OSHA Permissible Exposure Limits

29 CFR 1910.1001-1052, OSHA Toxic and Hazardous Substances: i.e., lead, asbestos, cadmium, benzene, and others

**Appendix 2—Chemical and Hazardous Materials Handling (continued)**

29 CFR 1910.1200, Hazard Communication Standard

29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories

29 CFR 1926, Subpart D, Occupational Health and Environmental Controls

29 CFR 1926, Subpart E, Personal Protective and Life Saving Equipment

29 CFR 1926, Subpart Z, Toxic and Hazardous Substances

ANSI Z88.2, Respiratory Protection (most recent addition)

ANSI Z358.1-1990, Emergency Shower and Eyewash Equipment, except for paragraphs 4.7.1, 5.5.1, 7.5.1, 9.5.1, and Appendix A, paragraph A.1

American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) 1997 Edition, Chemical Substances

DOE N 440.1, 7-15-97, Interim Chronic Beryllium Disease Prevention Program

## Appendix 3

## Confined Spaces Safety

**Performance Criteria:**

3.1. Worker health and safety at the Laboratory is assured for confined spaces activities by addressing the physical hazards of work in and the construction of confined spaces.

**Contractual Work Smart Standards:**

29 CFR 1910.146, Confined Space General Industry Standard

29 CFR 1910.268(o), Telecommunications Standard

29 CFR 1910.269(e), (t), Electric Power Standard

29 CFR 1926.21(b)(6), .352(g), .353(b), .651(g), Construction Industry Standards

## Appendix 4

## Construction Safety

**Performance Criteria:**

4.1 Worker health and safety at the Laboratory is assured for construction activities by addressing work within a construction area or the actual performance of construction projects and includes worker exposures, energized systems, excavations or penetrations, materials handling/heavy equipment, and elevated work surfaces.

**Contractual Work Smart Standards:**

29 CFR 1910, Occupational Safety and Health Standards, as applicable and appropriate

29 CFR 1926, Safety and Health Regulations for Construction, as applicable and appropriate

DOE Order 440.1A, Attachment 2, Sections 6, 7, 8, 14, Construction Safety

## Appendix 5

## Electrical Safety

**Performance Criteria:**

5.1. Worker health and safety at the Laboratory is assured for electrical activities by addressing work with and on electrical equipment and facilities throughout the lifecycle phases which are design, fabrication, construction, operation (to include experimental work and R&D), modification, maintenance, and decommissioning.

**Contractual Work Smart Standards:**

OSHA, 1970, Secs 4, 6, 8

29 CFR 1910.269, Electric Generation, Transmission and Distribution

29 CFR 1910, Subpart S, OSHA General Industry-Electrical

29 CFR 1926, Subparts K and V, OSHA Construction Industry-Electrical

NFPA 70, National Electrical Code, 1999

NFPA 70E, Electrical Safety Requirements for Employee Workplaces

ANSI/IEEE C2-1997, National Electrical Safety Code

## Appendix 6

### Environmental Restoration and Decontamination and Decommissioning (D&D) Safety

**Performance Criteria:**

6.1. Worker health and safety at the Laboratory is assured for site remediation, environmental restoration, D&D activities and waste handling by addressing the unique administrative requirements of Hazardous Waste Operator (HAZWOPER) training, Project/Site Specific Health and Safety Plans (HASP), as well as for drilling activities.

**Contractual Work Smart Standards:**

29 CFR 1910, Occupational Safety and Health Standards, as applicable and appropriate

29 CFR 1926, Safety and Health Regulations for Construction, as applicable and appropriate

API Recommended Practice for Installation, Maintenance, and Operation of Internal-Combustion Engines. API RP7C-11F, Fifth Edition, November 1, 1994.

API Recommended Practice for Inspection, Maintenance, Repair and Remanufacturing of Hoisting Equipment, API RP8B, Sixth Edition, December 1997, effective May 1, 1998.

API Specification for Oil Field Chain and Sprockets, API SPEC 7F, Fifth Edition, October 1, 1993.

API Recommended Practice on Application, Care and Use of Wire Rope for Oil Field Service, API RP9B, Ninth Edition, May 30, 1996, reaffirmed 1992.

## Appendix 7

## Ergonomics

**Performance Criteria:**

7.1. Worker health and safety at the Laboratory is assured for ergonomic activities by minimizing, mitigating, or eliminating disorders or cumulative trauma disorders which can be caused by a variety of factors as repetitive motion, awkward postures, high forces, vibration, and lack of recovery time for the body which are present in such activities as video display terminal use, materials handling, glovebox work, pipetting and others.

**Contractual Work Smart Standards:**

LA-WSS 402-870-01, LANL Ergonomic Standard

Public Law 91-596 Section 5(a)(1), Occupational Safety and Health Act, 1970, General Duty Clause

## Appendix 8

## Explosives Safety

**Performance Criteria:**

8.1. Worker health and safety at the Laboratory is assured for explosives work by addressing activities with and around explosives to prevent uncontrolled or unwanted energetic events and discharges.

**Contractual Work Smart Standards:**

29 CFR 1910.109, Explosives and Blasting Agents

29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals

DOE M 440.1 -1 (Rev. 8), 3/96, Explosives Safety Manual

## Appendix 9
## Fire Protection

**Performance Criteria:**

9. 1 A fire protection program exists which includes safety requirements that provide direction to implement fire protection activities at LANL and provides protection for personnel, structures, critical processes and controls, safety class systems, and components within facilities, vital programs, the public and the environment.

9. 2 Fire protection issues shall be addressed through all phases of design, fabrication, construction, commissioning, operation, modification, maintenance and decommissioning.

9. 3 An emergency management program, including fire department response, is established and provides effective services. See LPR 403-00-00, *Emergency Management*, and LIR 403-00-01, *LANL Emergency Management*.

9. 4 The Laboratory Director will appoint a Laboratory Fire Marshal who will perform the functions of "Fire Marshal," as well as the functions of the "Authority Having Jurisdiction (AHJ)," in fire protection matters as defined in the applicable National Fire Protection Association (NFPA)"National Fire Codes."

**Contractual Work Smart Standards:**

DOE Order 420.1, *Facility Safety*, Attachment 2 Contractor Requirements Document (CRD), Paragraphs 4.2 through 4.2.2.10, "Fire Protection," except with property loss criteria [¶ 4.2, 2nd paragraph (4), and ¶ 4.2.2.4] and assessment frequencies [¶ 4.2.1.9] which are established by LANL LIR 402-910-01, Section 6.1 (see below)

DOE M 440.1-1, *DOE Explosives Safety Manual*

29 CFR 1910, Occupational Safety and Health Standards

29 CFR 1926, Safety and Health Regulations for Construction

NFPA, National Fire Protection Association "National Fire Codes" (most recent edition) with the exception of NFPA 70, National Electrical Code

UBC, Uniform Building Code, 1997 Edition

NFDRS, National Fire Danger Reporting System

LANL LIR 402-910-01, *LANL Fire Protection Program*, Section 6.1, regarding periodic fire protection risk analyses/assessments, baseline property loss criteria, special fire protection requirements, and applicability of "life safety" codes and standards.

## Appendix 10

## Firearms Safety

**Performance Criteria:**

10.1. Worker health and safety at the Laboratory is assured for firearms activities by the safe handling and use of firearms.

**Contractual Work Smart Standards:**

10 CFR 1046, Physical Protection of Security Interests

10 CFR 1047, Limited Arrest Authority and Use of Force by Protective Force Officers

49 CFR 173, Shippers—General Requirements for Shipments and Packages

Atomic Energy Act of 1954, 42 United States Code (USC 2201K), as amended, Section 161

DOE Order 440.1A titled Firearms Safety

DOE Order 440.1A, Attachment 2, Section 16, Firearms Safety

U.S. Air Force Regulation AFR 50-36, dated march 15, 1984, Vol 1, Combat Arms Training and Maintenance Program Management, Chap.2, Facility Criteria, 2-6.b(b)1, including Figure 2-11, and 2-6b(2), including Table 2-1 as applicable to the m-79 grenade launcher.

## Appendix 11

## Food Sanitation

**Performance Criteria:**

11.1. Worker health and safety at the Laboratory is assured by food sanitation in the hygienic practices and necessary considerations to prevent the transmission of disease associated with the handling of food and equipment in food service and food preparation areas. Safe drinking water and sanitary sewer considerations are outside of this scope.

**Contractual Work Smart Standards:**

1995 U.S. Public Health Service Food Code (FDA), PB95-265492CEH

1993 Food Service and Processor Regulations (NMED) E1BFQM2

DOE Order 440.1A, Attachment 2, Section 18, Industrial Hygiene

## Appendix 12

## General Occupational Safety

**Performance Criteria:**

12.1. Worker health and safety at the Laboratory is assured for general occupational activities by addressing the general occupational health and safety (OSHA) aspects of work in an industrial environment. It specifically includes welding, brazing and cutting (and other spark/flame producing operations) equipment or work that produce enough sparks or flames to be considered a fire hazard; the use of machines, tools and equipment or related work in which the potential for mechanical hazards exists; heat and cold stress to workers in exposed environments; noise protection and hearing conservation; and proper illumination of work areas.

**Contractual Work Smart Standards:**

29 CFR 1910, Occupational Safety and Health Standards, as applicable and appropriate

NFPA, National Fire Codes

29 CFR 1926, Safety and Health Regulations for Construction, as applicable and appropriate

Occupational Safety and Health Act, 1970 Statute Public Law 91-596, Section 5a1 cited under the General Duty Clause

29 CFR 1904.1-13, Recording Occupational Injuries

29 CFR 1905, Variances, Limitations, Tolerances, Exemptions, etc.

American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), 1997 edition, Cold Stress; Heat Stress; Noise

**Appendix 13 Mandatory Document**

**Ionizing Radiation Safety**

**Performance Criteria:**

**13.1 Access Control**

Personnel entry and occupancy conditions shall be controlled for each radiological controlled area (RCA) and radiological area commensurate with hazards within the area.[10 CFR 835.501(a)(b)]

**13.2 ALARA**

Radiological work shall be conducted such that radiation doses resulting from the work are as low as reasonably achievable (ALARA).[10 CFR 835.101(c)]

The ALARA principle is not a dose limit, but an optimization process. Its objective is to maintain doses as far below the applicable limits as is reasonably achievable, taking into account social, technical, economic, practical, and public policy considerations.

**13.3 Area Designations**

Areas with potential radiological hazards shall be identified and designated.[10 CFR 835.401(a), 601]

**13.4 Contamination Control**

The Laboratory shall manage and control radioactive contamination to minimize personnel exposures and limit inadvertent transfer beyond area boundaries, consistent with ALARA.[10 CFR 835.1102]

**13.5 Radiological Design and Control**

A radiological engineering design and administrative control program shall be implemented to help ensure that personnel dose limits are not exceeded and that exposures are maintained as low as reasonably achievable (ALARA).[10 CFR 835.1002, 1003]

**13.6 Personnel Dosimetry**

External and internal radiation doses to personnel shall be monitored as necessary, commensurate with risk, for adequate management of radiation exposures from Laboratory operations and to demonstrate compliance with Chapter 14, "Personnel Dosimetry," of LIR402-700-01.[10 CFR 835.402]

**13.7 Emergency Exposures**

Radiation exposure may be allowed to substantially exceed regulatory occupational limits in the following circumstances:

- The rescue of victims of accidents involving radiation exposure whose lives are at stake,
- The mitigation of excessive radiation exposure to large populations, and
- The mitigation of damage to major property.

**13.8 Instrumentation**

An instrumentation program shall be established to ensure the quality and credibility of measurements used to support the Radiation Protection Program. Instruments and equipment used to obtain measurements of radioactivity and radiation exposure shall be calibrated, used, and maintained so results are accurately determined.[10 CFR 835.401(b)(1)]

**13.9 Performance Assessment**

Radiation protection performance shall be assessed to measure and promote conformance with the Laboratory's radiation protection requirements. The radiation protection assessments shall be used to help ensure that effective administrative and physical controls are in place and are maintained, analyzed, and enforced to prevent undue risk to workers.[10 CFR 835.102]

**13.10 Personal Protective Equipment**

When defined hazards are present or likely to be present, personal protective equipment (PPE) shall be identified and provided to protect individuals from injury, impairment, or any other harmful health effects of radiation. By its design, fit, and condition, PPE protects the individual from radioactive material that may be encountered through absorption, inhalation, or physical contact.[10 CFR 835.1102(e)]

**13.11 Planned Special Exposures**

A planned special exposure (PSE) may be authorized for a radiological worker to receive doses in addition to and accounted for separately from the doses received under the limits specified in Table 4-1 of LIR402-700-01, "Occupational Radiation Protection Requirements."[10 CFR 835.202, 204]

**13.12 Posting**

Radiological posting shall be used to alert personnel to the presence of radiation and radioactive materials and aid in controlling exposures and preventing the spread of contamination.[10 CFR 835.601]

**13.13 Radiation Hazard Communication**

Individuals shall be given instruction in radiation protection that is commensurate with the radiation protection problems they may encounter in the workplace.[10 CFR 835.901]

**13.14 Occupational Dose Limits**

Exposures to radiological workers and non-radiological workers (including the public) at the Laboratory shall not result in doses that exceed specified annual or lifetime limits.[10 CFR 835.202, 206, 207, 208]

**13.15 Records**

Radiation Protection Program records shall be maintained to document

- Doses to individuals,
- Radiological conditions of operations and facilities, and
- The performance and administration of the program.[10 CFR 835.701(a)]

**13.16 Sources**

Radioactive sources shall be controlled to prevent loss, unauthorized access, unnecessary dose to personnel, and spread of contamination during their use and storage.[10 CFR 835.1201]

### 13.17 Storage and Labeling

Radioactive materials shall be stored and properly identified to alert personnel to their presence and prevent inadvertent use or exposure.[10 CFR 835.605, 606]

### 13.18 Training

Employee knowledge of radiation safety concepts and practices shall be adequate for the purposes of controlling radiation exposures and contamination, and shall be commensurate with radiation hazards and job duties.[10 CFR 835.901, 902, 10 CFR 19.12, NRC Reg. Guide 8.27]

### 13.19 Workplace Monitoring

Radiological monitoring of the workplace shall be routinely performed, as necessary, to identify and control potential sources of personnel exposure to radiation and/or radioactive material.[10 CFR 835.401(a)(6)]

### 13.20 Work Planning

Work at the Laboratory involving radiological operations and activities shall be planned so that radiation protection measures, including ALARA practices, are incorporated as needed to provide for efficient and safe conduct of work.

**Contractual Work Smart Standards:**

10 CFR 835, Occupational Radiation Protection
10 CFR 830.120, Quality Assurance for Nuclear Facilities

## Appendix 14

## Material Handling Safety

**Performance Criteria:**

14.1. Worker health and safety at the Laboratory is assured for materials handling activities by addressing the equipment design and certification, maintenance and use of overhead cranes and hoists, mobile cranes, jacks, powered industrial trucks, hooks, cableways, sideboom tractors, slings, below-the-hook lifting devices, manually lever-operated hoists, articulating boom cranes, conveyors, tie downs, dollies, and carts.

**Contractual Work Smart Standards:**

29 CFR 1910, Subpart N, Material Handling and Storage
29 CFR 1926.251, Rigging Equipment for Material Handling
29 CFR 1926.305, Jacks-Lever and Ratchet, Screw and Hydraulic
29 CFR 1926.550, Cranes and Derricks
29 CFR 1926.552, Material Hoists, Personnel Hoists and Elevators
29 CFR 1926.553, Base-Mounted Drum Hoists
29 CFR 1926.554, Overhead Hoists
29 CFR 1926.555, Conveyors
29 CFR 1926.602, Material Handling Equipment
29 CFR 1926.853, Removal of Materials through Floor Openings
29 CFR 1926.953, Material Handling

## Appendix 15

### Nonionizing Electromagnetic Radiation and Fields Safety

**Performance Criteria:**

15.1. Worker health and safety at the Laboratory is assured for nonionizing electromagnetic radiation and fields activities by addressing the fabrication and use of lasers used as research tools as well as for construction and production (cutting and welding); work with light and near-infrared radiation, static magnetic fields, sub-radiofrequency (< 30kHz) magnetic and electric fields, microwaves and ultraviolet radiation; and research with electromagnetic pulse and high magnetic fields.

**Contractual Work Smart Standards:**

21 CFR 1040, Performance Standards for Light Emitting Products

29 CFR 1910, Occupational Safety and Health Standards

29 CFR 1926.21, Safety Training and Education

29 CFR 1926.54, Safety and Health for Construction

ACGIH, Threshold Limit Values, 1997: Light and Near-Infrared Radiation; Static Magnetic Fields; Sub-Radiofrequency (30kHz and below) Magnetic Fields; Sub-Radiofrequency (30kHz and below) and Static Electric Fields; Ultraviolet Radiation.

ANSI Z 136.1-1993, Safe Use of Lasers

ANSI Z 136.2, 1997, Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources

IEEE, American National Standards Safety Level with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300Ghz, C95.1-1991 (1992).
Where the ACGIH standard conflicts with the IEEE standard (specifically they overlap at the frequencies from 3kHz to 30kHz), the ACGIH guidance will be used because it is reviewed and updated annually.

American National Standard for Criteria for Safety Symbols, ANSI Z535.3-1991 (1991)

American National Standard for Environmental and Facility Safety Signs, ANSI Z535.2-1991 (1991)

## Appendix 16

## Nuclear Criticality Safety

**Performance Criteria:**

16.1. Worker health and safety at the Laboratory is assured for activities with a potential for nuclear criticality by addressing operations and activities which process, handle, store, or transport significant quantities of fissile materials to provide protection from the occurrence and consequences of a nuclear criticality accident.

**Contractual Work Smart Standards:**

ANSI/ANS-8.1-1981 (R1988), Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors

ANSI/ANS-8.3-1986, Criticality Accident Alarm System

ANSI/ANS-8.5-1966, Use of Borosilicate Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Materials"

ANSI/ANS-8.6-1966 (R1985), Safety in Conducting Subcritical Neutron-Multiplication Measurements in Situ

ANSI/ANS-8.7-1975 (R1987), Guide for Nuclear Criticality Safety in the Storage of Fissile Materials

ANSI/ANS-8.9-1987 (R1995), Nuclear Criticality Safety Criteria for Steel-Pipe Intersections Containing Aqueous Solutions of Fissile Material

ANSI/ANS-8.10-1983 (R1988), Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement

ANSI/ANS-8.12-1987 (R1993), Nuclear Criticality Control and Safety of Plutonium-Uranium Fuel Mixtures Outside Reactors

ANSI/ANS-8.15-1981 (R1995), Nuclear Criticality Control of Special Actinide Elements

ANSI/ANS-8.17-1984 (R1996), Criticality Safety Criteria for the Handling Storage, and Transportation of LWR Fuel Outside Reactors

ANSI/ANS-8.19-1996, Administrative Practices for Nuclear Criticality Safety

ANSI/ANS-8.20-1991, Nuclear Criticality Safety Training

ANSI/ANS-8.21-1995, Use of Fixed Neutron Absorbers in the Design of Nuclear Facilities Outside Reactors

ANSI/ANS-8.22-1997, Nuclear Criticality Safety Based on Limiting and Controlling Moderators

ANSI/ANS-8.23-1997, Nuclear Criticality Accident Emergency Planning and Response

**Appendix 17**

**Occupational Medicine**

**Performance Criteria**

17.1. Worker protection medical evaluation systems are in place to ensure applicable replacement, job-transfer, termination, and regulatory driven medical surveillance and/or certification evaluations are performed; occupational medicine staff team with other ESH disciplines in performing field support, worksite evaluations, assessment of job demands and potential hazards to ensure adequate worker health and safety assessment during these evaluations.

17.2. Human reliability and fitness for duty evaluation and counseling systems are in place to ensure identification, correction, and prevention of instances in which worker physical and/or mental health are incompatible with the safe and reliable performance of job tasks. Systems for the evaluation, triage, treatment and management of rehabilitation of occupational injuries and illnesses, initial management and referral for nonoccupational illness and injury, institutional support for disability case management under ADA, and safe return-to-work are in place.

17.3. An emergency response program exists that provides occupational medicine staff, services, and facility support to site operational emergencies; services are integrated with surrounding community medical care facilities.

**Contractual Work Smart Standards:**

DOE Order 440.1A, Attachment 2, Section 19, Occupational Medicine

10 CFR 1046, Physical Protection of Security Interests

10 CFR 26, Fitness for Duty Programs

10 CFR 707, Workplace Substance Abuse Programs at DOE Facilities

10 CFR 710, Access to Classified Material and SNM

10 CFR 745, Federal Policy for the Protection of Human Subjects; Notices and Rules

10 CFR 835, Occupational Radiation Protection

21 CFR 50, Protection of Human Subjects

21 CFR 56, Institutional Review Boards

29 CFR 1910, Occupational Safety and Health Standards

29 CFR 1926, Safety and Health Regulations for Construction

42 CFR 2, Confidentiality of Alcohol and Drug Abuse Patient Records

42 CFR 405, Federal Health Insurance for the Aged and Disabled, et. al., Clinical Laboratory Improvement Amendments of 1988

45 CFR 46, Subparts B, C, and D, Research Activities which may be reviewed through expedited review procedures; Department of Health and Human Services, Protection of Human Subjects

49 CFR 30-399, Department of Transportation, Motor Carrier Safety Regulations

**Appendix 17—Occupational Medicine (continued)**

49 CFR 382, Controlled Substances and Alcohol Use and Testing
49 CFR 40, Procedures for Transportation Workplace Drug Testing
5 CFR 630.1207, Medical Certification
Americans with Disabilities Act (ADA)
Atomic Energy Act 1954, Sec. 143, "DoD Participation"
Family Medical Leave Act (FMLA)
New Mexico Workers' Compensation Act
Privacy Act, California Information Practices Act
Rehabilitation Act

## Appendix 18

## Pressurized Systems and Cryogens

**Performance Criteria:**

18.1. Worker health and safety at the Laboratory is assured for pressurized work by addressing activities with pressure vessels and equipment, compressed gases and gas cylinders, vacuum equipment and systems, hydraulics, and cryogenic materials and systems.

**Contractual Work Smart Standards:**

49 CFR 171-179, Storage and Transportation
29 CFR 1910.101, Compressed Gas
29 CFR 1910.102, Acetylene
29 CFR 1910.103, Hydrogen
29 CFR 1910.104, Oxygen
29 CFR 1910.110, Storage and Handling - LPG
29 CFR 1910.147, Lockout/Tagout
29 CFR 1910.169, Air Receivers
29 CFR 1910.217 (b) (12), Pressure Vessels
29 CFR 1910.253, Oxygen fuel gas/welding and cutting
29 CFR 1926.55, Gases, Vapors, etc.
29 CFR 1926.153, LPG
29 CFR 1926.306, Air Receivers
29 CFR 1926.350, Gas Welding and Cutting
DOE Order 440.1A, Attachment 2, Section 20, Pressure Safety

## Appendix 19

## Traffic Safety

**Performance Criteria:**

19.1. Worker health and safety at the Laboratory is assured for traffic related activities by addressing the driver or operator and the use of motor vehicles including special purpose vehicles; aviation in research, and development activities; and traffic design standards to provide for safe travel.

**Contractual Work Smart Standards:**

14 CFR, Aeronautics and Space (promulgated by FAA)

29 CFR 1910, Occupational Safety and Health Standards

49 CFR 106, 107, 171, 172, 173, 177, 178, 40, 382, 383, 390-397, 399, Transportation

American Disability Act (ADA)

Manual on Uniform Traffic Control Devices (MUTCD)

New Mexico State Highway and Transportation (NMSH&T) Specifications for Bridge and Road Construction

State of New Mexico, MVC 5-93

State of New Mexico, TRD Rule MCS-96, New Mexico Adoption of Federal Motor Carrier Safety Regulations with certain amendments